

REGENERATION AFTER CLEARING AT
KIRSTENBOSCH.

By

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(With Plate XXII.)

It was considered of interest to make a record of the plants growing on a newly cleared piece of ground in Kirstenbosch, with observations on the occurrence of species, colonisation and succession. The ground was formerly covered with a dense growth of selfsown *Pinus pinaster*, 19 years old, and had been planted with this Pine about 30 years before ; so that it had been occupied by pine forest altogether for about 50 years, except in the interval between clearing and regeneration, in about 1915-16. The area was cleared by felling of the pines and burning of the debris in sections during 1933-35, at which time there was very little undergrowth except on tracks and fire-paths. Part of the clearing more or less centrally situated was selected for this work, covering an area of about 25 acres, as shown in the plan (Fig. 1), and collecting was done from March, 1935, to January, 1936 (except for 6 weeks during May and June). The record is claimed to be complete only for plants present in December, 1935. It will be of interest to repeat the survey of this area (in which Pines are to be excluded in future) from time to time. It is hoped that the study may help to answer the question whether typical indigenous vegetation can re-establish itself upon such an area of Pine plantation after clearing.

The clearing is on a talus slope, of low gradient for the most part, formed of an accumulation of rocks of the Table Mountain Sandstone series over granite, the soil being mostly sandy. The habitat is more or less the same over the area selected, except for a small part where a stream forms in winter. The altitude of the area extends from 300 to 500 ft. above sea level.

The occurrence of most species is very erratic, so that a species which is occasional over most of the area may be frequent in some parts and absent in others ; where the proportion of individuals is low a species is recorded as of occasional occurrence.

THE FLORA.

The following is the list of species collected, arranged in families according to the system of classification of Bentham and Hooker. The collection is housed at Kirstenbosch. The totals are: Genera 224: Species 402.

(*R*=rare; *O*=occasional; *F*=frequent; *A*=abundant. Species in italics are aliens or escapes from cultivation.)

Ranunculaceae.

- R. Knowltonia hirsuta*, DC.
O. K. vesicatoria, Curt.
O. Ranunculus pubescens, Thunb.
 (*R. pinnatus*, Poir.)

Menispermaceae.

- R. Antizoma capensis*, Diels.

Papaveraceae.

- O. Fumaria Mundtii*, Spreng.
O. F. officinalis, Linn.
R. Corydalis Cracca, Schl.

Cruciferae.

- R. ? Seneciera didyma*, Pers.
O. Heliophila scoparia, Burch.
R. Raphanus Raphanistrum, Linn.

Violaceae.

- O. Viola tricolor*, Linn.

Flacourtiaceae.

- R. Kiggelaria africana*, Linn.

Polygalaceae.

- F. Muraltia Heisteria*, DC.
F. Polygala bracteolata, Linn.
R. P. myrtifolia, Linn.

Caryophyllaceae.

- O. Cerastium Dregeanum*, Fenzl.
O. Polycarpon tetraphyllum, L.f.
F. Silene gallica, Linn.
O. S. undulata, Ait.
R. Spergula arvensis, Linn.

Malvaceae.

- O. Hibiscus aethiopicus*, Linn.
O. H. trionum, Linn.
R. Malvastrum capense, Gray and Harv.

Sterculiaceae.

- F. Hermannia hyssopifolia*, Linn.

Linaccae.

- O. Linum quadrifolium*, Linn.

Geraniaceae.

- R. Geranium dissectum*, Linn.
F. G. incanum, Linn.
R. Pelargonium betulinum, Ait.
F. P. capitatum, Ait.
F. P. chamaedrifolium, Jacq.
A. P. cucullatum, Ait.
R. P. Dodii, Schl. ex Knuth.
F. P. grossularioides, Ait.

Geraniaceae.

- O. P. myrrhifolium*, Ait.
R. P. radula, Ait.
O. P. saniculifolium, Willd.
O. P. tabulare, L'Herit.
O. P. triste, Ait.
R. Oxalis glabra, Thunb.
O. O. lanata, Lf.
R. O. variabilis, Lindl.
R. O. versicolor, Linn.

Celastraceae.

- O. Gymnosporia buxifolia*, Syzsz.
O. G. laurina, Thunb.
R. G. acuminata, Syzsz.

Rhamnaceae.

- O. Phylica capitata*, Thunb.
R. P. imberbis, Berg, var. *eriphora*, Pillans MS.
R. P. stipularis, Linn.

Anacardiaceae.

- O. Rhus angustifolia*, Linn.
R. R. lucida, Linn.
O. R. mucronata, Thunb.
O. R. tomentosa, Linn.

Leguminosae.

- F. Podalyria calyptrata*, Willd.
R. Liparia sphaerica, Linn.
O. Rafnia triflora, Thunb.
O. Borbonia cordata, Linn.
O. Aspalathus astroites, Linn.
R. A. Benthami, Harv.
F. A. divaricata, Thunb.
O. A. macrantha, Harv.
R. A. thymifolia, Linn.
F. Argyrolobium lanceolatum, E. and Z.

- O. Trifolium agrarium*, L.

- F. T. angustifolium*, L.
R. Psoralea aculeata, Linn.
O. P. bracteata, Linn.
R. P. decumbens, Ait.
F. P. pinnata, Linn.
R. Indigofera coriacea, Ait.
F. I. cytisoides, Thunb.
O. I. filifolia, Thunb.
F. I. filiformis, Thunb.
F. I. gracilis, Spreng.

Regeneration after Clearing at Kirstenbosch.

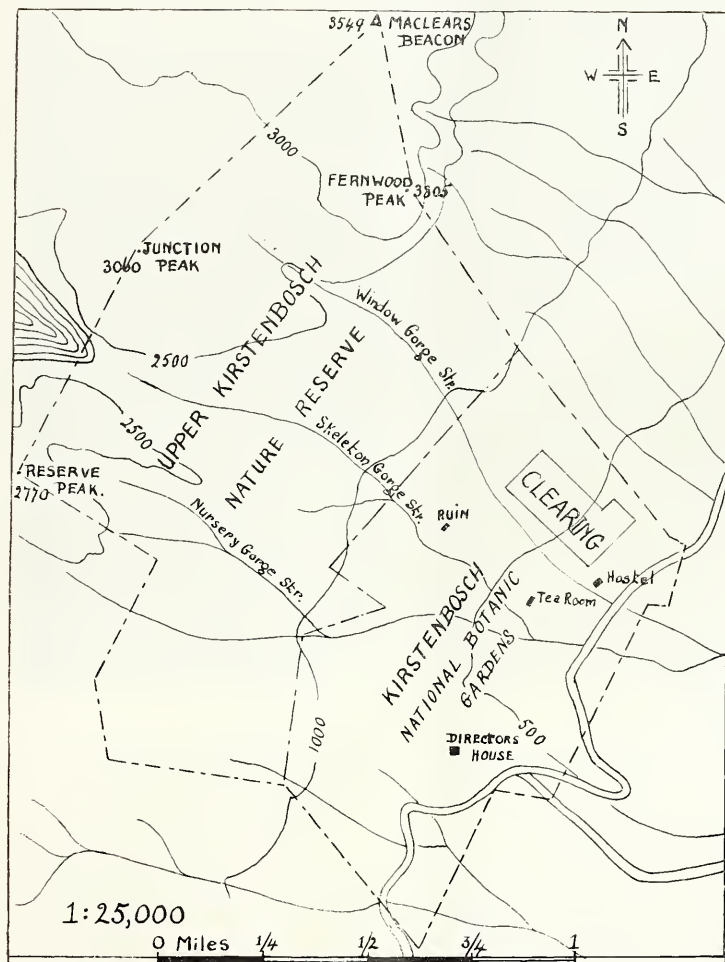


FIG. 1. Plan of Kirstenbosch, showing position of Clearing. (Del. W. F. Barker.)



PLATE XXII.

FIG. 1. *Indigofera cytisoides* (right) and *Podalyria calyptata* (left) forming thickets, with *Roella decurrens* growing around and amongst them. In the foreground are *Osteospermum moniliferum*, *Metalsia muricata*, grasses, etc.

FIG. 2. *Roella decurrens*; with the more recently cleared area beyond.

FIG. 3. *Roella decurrens*, growing on a rocky slope.

FIG. 4. Close growth of *Helichrysum capitellatum*, *Ehrharta aphylla*, *Roella decurrens*, etc., with *Aspalathus divaricata* in foreground (right) and forming dense thickets at the back.

Leguminosae.

- R. I. sarmentosa*, L.f.
O. Lessertia linearis, DC.
F. Hallia cordata, Thunb.
F. H. imbricata, Thunb.
R. Vicia sativa, Linn.
F. Dolichos gibbosus, Thunb.
F. Fagelia bituminosa, DC.
F. Rhynchosia totta, DC.
O. Virgilia capensis, Lam.
R. Acacia saligna, Wendl.
O. A. longifolia, Willd.
O. Albizzia lophantha, Benth.

Rosaceae.

- R. Alchemilla capensis*, Thunb.
O. Cliffortia filifolia, L.f.
F. C. polygonifolia, L. var. *trifoliata*,
 (L.) Harv.
O. C. ruscifolia, Linn.
R. Rubus fruticosus, Linn.
R. R. pinnatus, Willd.

Crassulaceae.

- R. Crassula flava*, Linn.
R. C. glomerata, Linn.
R. C. scabra, L.f.
O. C. septas, Thunb.
R. Rochea coccinea, DC.
R. R. odoratissima, DC.

Droseraceae.

- R. Drosera hilaris*, Cham. and Schl.

Halorrhagidaceae.

- R. Serpicula repens*, Linn.

Onagraceae.

- R. Epilobium tetragonum*, Linn.
R. Oenothera biennis.
R. Oenothera noctiflorum.
F. Montinia acris, L.f.

Cucurbitaceae.

- R. Melothria punctata*, Cogn.

Ficoideae.

- R. Carpoprotus acinaciformis*, L.
 Bolus.
O. C. edulis, N.E. Br.
R. C. ?Muirii, L. Bolus, var. *angusta*.
F. Erepisia bracteata, N.E. Br.
R. Mesembryanthemum monticolum,
 L. Bolus.
R. Skiatophytum Tripolium, L. Bolus.

Umbelliferae.

- O. Hermas depauperata*, L. (H.
villosa, Thunb.)
O. Hydrocotyle Centella, Ch. and
 Schl.
R. H. tridentata, L.f.
F. Lichtensteinia lacera, Ch. and Schl.
O. Oenanthe filiformis, Lam.
O. Peucedanum Galbanum, B. and H.
R. P. Sieberianum, Sond.
F. P. tenuifolium, Thunb.
R. Caucalis africana, Thunb. (*Torilis*
africana, Spreng.)

Rubiaceae.

- O. Anthospermum aethiopicum*, Linn.
R. A. ciliare, Linn.
O. A. hirtum, Cruse.
O. Carpacoce spermacoceae, Sond.
R. Plectronia ventosa, Linn.

Dipsacae.

- O. Cephalaria rigida*, Schrad.
R. Scabiosa Columbaria, Linn.

Compositae.

- R. Corymbium nervosum*, Thunb.
R. Aster fruticosus, Linn.
R. Felicia (A. tenellus, Linn.)
R. F. (A. capensis, Less.).
F. Erigeron canadense, Linn.
F. Conyza ambigua, DC.
O. Chrysocoma Coma-aurea, Linn.
F. Gnaphalium candidissimum, Lam.
F. G. luteo-album, Linn.
O. G. purpureum, Linn.
R. Helipterum speciosissimum, DC.
R. Helichrysum auriculatum, Less.
F. H. capitellatum, Less.
R. H. crispum, Less.
T. H. cymosum, Less.
R. H. ericifolium, Less.
R. H. ericifolium var. lineare, Harv.
F. H. expansum, Less.
O. H. foetidum, Cass.
R. H. fruticans, Less.
R. H. humile, Andr.
F. H. odoratissimum, Less.
R. H. rubellum, Less.
R. H. rutilans, Less.
R. H. serpyllifolium, Less.
R. H. sesamoides, Thunb.
F. Stoebe cinerea, Thunb.

Compositae.

- R. S. incana*, Thunb.
R. S. plumosa, Thunb.
R. S. ?prostrata, Linn.
O. Leontonyx glomeratus, DC. var. *intermedius*.
F. L. spatulatus, Less.
R. L. spatulatus, var. *candidissimus*.
R. L. squarrosus, DC.
R. Leyssera gnaphalioides, L.
F. Metalasia muricata, Less.
R. Printzia aromatica, Less.
R. Osmites dentata, Thunb.
O. Bidens pilosa, Linn.
O. Athanasia crithmifolia, Linn.
O. Cotula (Cenia) *turbinata*, Linn.
O. Alciopie tabularis, DC.
F. Senecio Burchellii, DC.
R. S. elegans, Link.
F. S. erubescens, Ait.
F. S. grandiflorus, Berg.
O. S. halimifolius, Linn.
O. S. laevigatus, Thunb.
R. S. lanceus, Ait.
O. S. pterophorus, DC. var. *aptera*, Harv.
F. S. pubigerus, Linn.
R. S. verbascifolius, Burm.
O. S. rigidus, Linn.
R. S. rosmarinifolius, L.f.
O. S. subcanescens, Compton.
O. S. umbellatus, Linn.
R. S. glastifolius, L.f.
R. Othonna parviflora, Linn.
R. O. tuberosa, Thunb.
O. Osteospermum moniliferum, Linn.
O. Ursinia crithmifolia, Spreng.
F. U. dentata, Poir.
R. U. cakilefolia, DC.
R. Haplocarpha lanata, Less.
O. Gerbera Burmannii, Cass.
A. Hypochoeris radicata, Linn.
F. Sonchus oleraceus, Linn.
R. Tripteris hyoseroides, DC.
R. Cineraria geifolia, L. var. *glabra*.
R. Arctotis sp.

Campanulaceae.

- F. Lobelia coronopifolia*, Linn.
O. L. Erinus, Linn.
R. L. lutea, Linn.

Campanulaceae.

- O. L. pinifolia*, Linn.
O. L. triquetra, Linn.
F. Cyphia bulbosa, Berg.
R. C. volubilis, Willd.
R. Lightfootia oxycoccoides, L'Hérit.
O. Wahlenbergia capensis, DC.
F. W. cernua, DC.
F. W. cernua, var. *minor*, Sond.
O. W. exilis, DC.
A. Roella decurrens, L'Hérit.
O. R. ciliata, Linn.
O. Treichelia longibracteata, Vatke.
R. Prismaetocarpus nitidus, L'Hérit.

Ericaceae.

- O. Erica hirtiflora*, Curt.
R. E. imbricata, Linn.
R. E. Plukenetii, Linn.
R. E. ramentacea, Linn.
R. E. thymifolia, Andr.
R. E. sp. ? mammosa, Linn.
R. Scyphogyne inconspicua, Brongn.
R. Simocheilus glabellus, Benth.

Primulaceae.

- F. Anagallis arvensis*, Linn.
F. A. arvensis, var. *coerulea*, Gren. and Godr.

Myrsinaceae.

- O. Myrsine africana*, Linn.

Ebenaceae.

- O. Royena glabra*, Linn.
O. R. lucida, Linn.

Oleaceae.

- O. Olea capensis*, Linn.
O. O. verrucosa, Link.

Asclepiadaceae.

- R. Asclepias crispa*, Berg.
R. Secamone Alpini, Schult.

Gentianaceae.

- F. Sebacea aurea*, R.Br.

Solanaceae.

- R. Physalis peruviana*, L.
R. Solanum aculeastrum, Dun.
R. S. auriculatum, Linn.
O. S. nigrum, Linn.

Scrophulariaceae.

- R. Verbascum virgatum*, With.
F. Hemimeris montana, L.f.
O. Nemcsia chamaedrifolia, Vent.
R. N. foetens, Vent.

Scrophulariaceae.

- O. N. lucida*, Benth.
- R. Halleria lucida*, Linn.
- R. Teedia lucida*, Rud.
- F. Zaluzianskya dentata*, Walp.
- F. Phyllopodium capitatum*, Benth.
- R. Sutura brachiata*, Roth.
- O. Melasma luridum*, Hiern.
- O. Diascia elongata*, Benth.

Myoporaceae.

- F. Oftia africana*, Bocy.

Selaginaceae.

- F. Dischisma ciliatum*, Chois.
- O. Selago corymbosa*, Linn.
- R. S. quadrangularis*, Chois.
- O. S. serrata*, Berg.
- F. S. spuria*, Linn.
- O. Agathelpis angustifolia*, Chois.

Verbenaceae.

- R. Verbena bonariensis*, Linn.
- R. V. officinalis*, Linn.

Labiatae.

- O. Cedronella triphylla*, Moench.
- R. Salvia paniculata*, Thunb.
- R. Leonotis Leonurus*, R.Br.

Plantaginaceae.

- R. Plantago lanceolata*, Linn.

Amarantaceae.

- R. Achyranthes argentea*, Lam.

Chenopodiaceae.

- O. Chenopodium ambrosioides*, Linn.

Phytolaccaceae.

- F. Phytolacca octandra*, L.

Polygonaceae.

- O. Polygonum aviculare*, Linn.
- F. Rumex Acetosella*, Linn.
- O. R. cordatus*, Desf.
- R. R. crispus*, Linn.
- R. R. pulcher*, Linn.

Lauraceae.

- R. Cassytha ciliolata*, Nees.

Proteaceae.

- R. Leucospermum conocarpum*, R. Br.
- R. Serruria Burmanni*, R. Br.

Thymelaeaceae.

- F. Passerina vulgaris*, Thoday.
- O. Gnidia juniperifolia*, Lam.
- O. G. sericea*, Linn.

Santalaceae.

- O. Thesium scabrum*, Linn.
- F. T. strictum*, Berg.
- O. T. virgatum*, Lam.
- F. Thesium longifolium*, A. W. Hill.

Euphorbiaceae.

- R. Euphorbia erythrina*, Link.
- O. E. Helioscopia*, Linn.
- O. E. Peplus*, Linn.
- O. E. tuberosa*, Lam.
- O. Cluytia alaternoides*, Muell-Arg.
- O. C. pulchella*, Linn.
- R. C. pterogona*, Muell-Arg.
- R. Leidesia capensis*, Muell-Arg.

Myricaceae.

- O. Myrica quercifolia*, Linn.

Coniferae.

- O. Widdringtonia cupressoides*, Schrad.

Orchidaceae.

- R. Acrolophia tristis*, Sch. and Bolus.
- R. Satyrium ligulatum*, Lindl.
- R. S. odorum*, Sond.
- O. Disa macrantha*, Bolus.

Haemodoraceae.

- F. Wachendorfia paniculata*, Linn.
- O. W. sp.*
- F. Cyanella capensis*, Linn.

Iridaceae.

- R. Morea crispa*, Ker.
- F. M. edulis*, Ker. var. *longifolia*, Sweet.
- R. M. ramosa*, Ker.
- O. M. tricuspis*, Jacq.
- O. M. tripetala*, Ker.
- F. Homeria collina*, Vent.
- O. Hexaglottis longifolia*, Vent.
- O. Bobartia gladiata*, Ker.
- O. B. spathacea*, Ker.
- O. Aristeia capitata*, Ker.
- O. A. cyanea*, Soland.
- R. A. spiralis*, Ker.
- R. A. sp. nov.*
- R. Geissorhiza secunda*, Ker.
- O. Ixia polystachya*, Linn.
- O. Micranthus plantagineus*, Eckl.
- O. Watsonia punctata*, Ker.
- O. W. rosea*, Ker.
- R. W. tabularis*, Mathews and Bolus.

Iridaceae.

- O. Gladiolus brevifolius*, Jacq.
R. Chasmanthe aethiopica, N.E. Br.
O. Anapalina triticea, N.E. Br.

Amaryllidaceae.

- R. Haemanthus coccineus*, Linn.
O. Hypoxis stellata, L.f.

Liliaceae.

- O. Asparagus africanus*, Lam.
R. A. scandens, Thunb.
O. A. Thunbergianus, Schult.
R. Kniphofia uvaria, Hook.
F. Bulbine favosa, Roem. and Schultes.
R. B. praeorsora, Roem. and Schultes.
O. Anthericum elongatum, Bak.
O. A. hirsutum, Thunb.
O. A. longifolium, Jacq.
O. Agapanthus africanus, Linn.
O. Lachenalia glauca, Jacq.
F. Ornithogalum hispidum, Horn.
R. O. lacteum, Jacq.
O. Baecometra columellaris, Salisb.
O. Caesia Dregeana, Kunth.
R. C. Eckloniana, Roem. and Schultes
O. Albuca minor, Linn.
O. A. major, Linn.

Juncaceae.

- R. Juncus anonymus*, Steud.
R. J. capensis, Thunb. var. *Ecklonii*,
 Buchen.
O. J. capensis, Thunb. var. *macran-*
thus, Adamson.
R. J. Sphagnetorum (Buch.) Adam-
 son.

Araceae.

- R. Richardia africana*, Kunth.

Restionaceae.

- R. Restio cuspidatus*, Thunb.
R. Thamnochortus dichotomus, R.Br.
R. T. fruticosus, Berg.

Cyperaceae.

- O. Mariscus congestus*, C. B. Clarke.
R. M. riparius, Schrad.
F. Scirpus antarcticus, Linn.
R. S. Ludwigii, Boeck.
R. S. prolifer, Rottb.

Cyperaceae.

- R. S. sp.*
F. F. Ficinia bracteata, Boeck.
F. F. bulbosa, Nees.
O. F. fastigiata, Nees.
F. F. filiformis, Schrad.
O. F. ramosissima, Kunth.
R. F. scariosa, Nees.
R. F. setiformis, Schrad.
R. Carpha glomerata, Nees.
O. Tetraria cuspidata, C.B.Cl.
R. T. compar, Lestib.
O. T. sylvatica, C.B.Cl.
R. T. ustulata, C.B.Cl.

Gramineae.

- O. Andropogon Nardus*, Linn. var.
marginatus, Hack.
O. Paspalum dilatatum, Poir.
R. P. sp.
R. Pennisetum macrourum, Trin.
R. Stenotaphrum glabrum, Trin.
O. Holcus setiger, Nees.
R. Koeleria cristata, Pers.
R. Avena fatua, Linn.
O. A. sativa, Linn.
R. Pentachistis aspera, Stapf.
F. P. Thunbergii, Stapf.
O. Danthonia lanata, Schrad.
O. D. stricta, Schrad.
O. D. macrantha, Schrad.
O. Lagurus ovata, Linn.
R. Polypogon tenuis, Brongn.
O. Agrostis lachnantha, Nees.
F. Aira caryophylla, Linn.
R. Sporobolus indicus, R. Br.
R. Eragrostis curvula, Nees.
O. Cynodon Dactylon, Pers.
F. Ehrharta calycina, Sm.
O. E. erecta, Lam.
O. E. longifolia, Schrad.
O. E. Rehmanni, Stapf.
F. E. aphylla, Schrad.
O. Phalaris minor, Retz.
F. Cynosurus echinatus, L.
F. Brizopyrum capensis, Trin.
R. B. capensis Trin. var. *villosum*,
 Stapf.
F. Briza maxima, Linn.
O. B. minor, Linn.
F. Festuca scabra, Vahl.

Gramineae.

- O. Bromus maximus*, Desf.
R. B. patulus, Mert. and Koch. var.
 vestitus Stapf.
O. Brachypodium flexum, Nees.
O. Lolium temulentum, Linn.

Filices.

- F. Pteridium aquilinum*, Kuhn.
R. Pellaea pteroides (Linn.) Prantl.
R. Asplenium adiantum-nigrum, Linn
R. Mohria caffrorum, Desv.
O. Schizaea pectinata, Sw.

COLONISATION AND SUCCESSION.

Colonisation can be observed to have taken place from—

(a) plants present or at hand before the ground was cleared, such as *Pelargonium cucullatum*, *Senecio pubigerus*, *Oftia africana*, etc.;

(b) a small strip of sub-climax association on a rocky slope above and adjoining the clearing. (Apart from this the clearing is bounded by oak forest, Eucalyptus and Pine plantations and forest growing amongst talus boulders.) Such colonizers are *Ehrharta aphylla*, *Peucedanum tenuifolium*, *Cephalaria rigida*, etc.;

(c) more distant sources. Examples of interest are those plants which have arrived from the mountain, and grow normally on the plateau or in the region of S.-E. cloud, such as *Senecio verbascifolius* and *Prismatocarpus nitidus*, or on cliffs as *Rockea coccinea*, *Mesembryanthemum monticolum* and *Crassula scabra*. It is apparent that these plants will not survive long here, either dying with the progress of summer or being choked out. Several plants grown in the adjoining cultivated portion of the Gardens have come up in small numbers.

Stages in the regeneration can be inferred from observation of growth on successively cleared sections of the area. That cleared towards the beginning of 1935 had the ground covering of pine needles remaining, whereas some sections had been burnt after clearing. Here, where the covering is thicker, pine seedlings only are growing; patches are present, however, where rubbish was burnt and on these seedlings have come up abundantly, chiefly the following:—

Senecio Burchellii, *S. pubigerus*, *S. rigidus*, *Selago spuria*, *Scirpus antarcticus*, *Pelargonium cucullatum*, *P. capitatum*, *P. chamaedrifolium*, *Roella decurrens*, *Hypochoeris radicata*, *Thesium strictum*, *Thesidium longifolium*, pine seedlings being absent. Some burnt patches have a thick growth of one species, indicating the presence of the seeds before burning and, where the surrounding ground is more open, the advantageous effect of burning on germination. Such species are *Albizzia lophantha*, *Indigofera cytisoides*, *Psoralea pinnata* and *Pelargonium cucullatum*. As the ground becomes clearer plants obtaining a hold are extremely varied. On another section where the ground apparently was not burnt an association still very open consists of the above-mentioned species, and the following:—

Phyllopodium capitatum, *Silene gallica*, *Sonchus oleraceus*, *Briza maximus*, *Dischisma ciliatum*, *Lobelia triquetra* amongst the annual species, and others are *Senecio erubescens*, *S. umbellatus*, *Erigeron canadense*, *Montinia acris*, *Lichtensteinia lacera*, *Peucedanum tenuifolium*, *Alciope tabularis*, *Erepsia bracteata*, *Pteridium aquilinum*, *Ornithogalum hispidum*, etc.

With further development the association becomes more closed, plants such as *Helichrysus odoratissimum* and *Ursinia dentata* spreading on the ground, with taller plants growing above such as *Pelargonium cucullatum*, *Senecio pubigerus*, *Osteospermum moniliferum*; aggressive plants are *Aspalathus divaricata*, *Oftia africana* and *Roella decurrens*; patches between are covered with *Helichrysus expansum*, *Hypochoeris radicata*, *Erepsia bracteata*, *Pentaschistis Thunbergii*, etc.

On exposed rocky ground an open association is composed of the following:—*Thesium strictum*, *Pelargonium cucullatum*, *Roella decurrens*, *Podalyria calypttrata*, *Ficinia filiformis*, *Muraltia Heisteria*, *Peucedanum tenuifolium*, *Royena glabra*, *Passerina vulgaris*, *Psoralea pinnata*, *Selago spuria*, *Helichrysus expansum*, *Albua minor*, *Anapalina triticea*, *Tetragia ustulata*, *T. cuspidata*, *Indigofera filiformis*, *Metalsia muricata*, *Stoebe cinerea*, *Hermas depauperata*, *Thesidium longifolium*, *Ficinia bulbosa*, etc.

Beside this in a slight hollow where the soil is moister an almost closed association is found containing most of the above-mentioned plants and others, such as *Hallia cordata*, *H. imbricata*, *Thesium scabrum*, *Brizopyrum capensis*. Here *Psoralea pinnata* forms thickets, while *Roella decurrens* and others such as *Borbonia cordata* become aggressive.

On a higher part of the clearing the association is composed of the same species as already mentioned and others such as *Festuca scabra*, *Bobartia spathacea*, *Aristea capitata*, *Hermannia hyssopifolia*, etc. The association becomes closed with such plants as *Aspalathus divaricata*, *Fagelia bituminosa*, *Dolichos gibbosus*, *Danthonia macrantha*, *Roella decurrens*, *Ehrharta aphylla*, spreading and together with *Indigofera cytisoides* becoming dominant in patches. In one part a dense mass is formed from *Fagelia bituminosa* enclosing *Aspalathus astroites*, *A. divaricata* and *Indigofera cytisoides*, with *Senecio pubigerus*, *S. rigidus* and *Osteospermum moniliferum* struggling up, and *Ficinia filiformis* and *Helichrysus odoratissimum* growing underneath. *Roella decurrens* *

* *Roella decurrens*, which is usually of rare occurrence and slender habit, is extremely abundant and of robust habit here. Seedlings are growing prolifically almost everywhere. The plants spread and form a dense growth in winter and spring and with the onset of summer take on a coppery colour; they reach about two feet in height. The life of the plants may be only three or four years. The species is apparently a pioneer and not a permanent component of the climax vegetation.

forms an almost pure association in parts, growing densely, with *Ehrharta aphylla*, *Indigofera cytisoides*, *Pelargonium cucullatum* and *Senecio grandiflorus* growing amongst it.

Other communities to be noted on the clearing are the following :—*Aspalathus divaricata* and *Podalyria calyptrata* forming an almost pure association with *Senecio pubigerus* occurring here and there : *Aspalathus macrantha* with *Fagelia bituminosa* enclosing it, forming a closed association ; *Aspalathus divaricata* is also present : *Rafnia triflora*, *Aspalathus divaricata* and *Fagelia bituminosa* forming a closed association : *Rafnia triflora* growing densely, to its full height, with plants beneath it covering the ground densely, including seedlings of *Osteospermum moniliferum*, *Phytica capitata*, *Anthospermum hirtum*, etc. : *Indigofera cytisoides* forming a pure thicket in parts. The germination of these thickly growing Leguminosae is apparently favoured by burning. It appears probable that the seeds of these Leguminosae, which have now germinated in great numbers, had lain in the ground for at least 15 years.

At the time of this survey the vegetation consists of an irregular tangle of herbaceous plants, quick-growing soft-wooded shrubs, herbaceous climbers, shrubby Leguminosae with hard-coated resting seeds whose germination is favoured by burning, bulbous plants and annuals. There are signs of the regeneration of certain Proteaceae, Ericaceae and other hard-wooded shrubs which may become components of the climax vegetation of open slopes, but hitherto there is nothing to suggest the regeneration of sclerophyll forest. The majority of the plants present are clearly members of an early stage in a secondary succession and will soon disappear and be succeeded by a later phase : and it will be of considerable interest to survey the progress of the succession from time to time.

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